1.3 Box and Whisker Plot

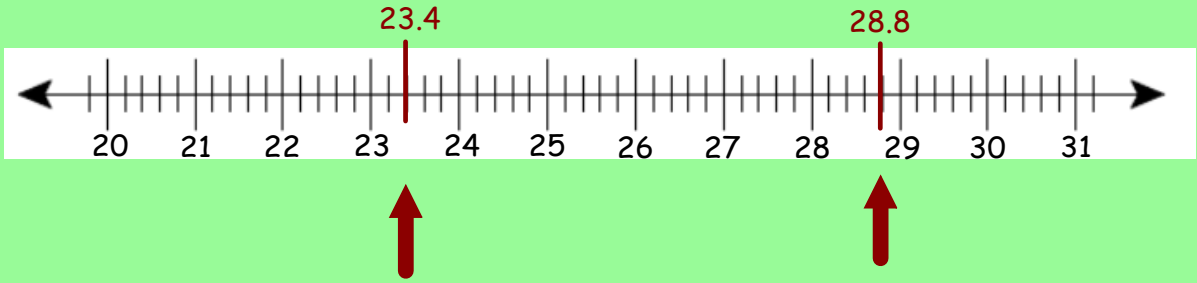
Box and Whisker Plot = a type of graph used to display data. It shows how data are dispersed around a median, but does not show specific items in the data.

How to form one:

Example: The data below represents how long it took people to eat at a local restaurant. It has been put into order.

23.4	24.3	24.8	25.0	25.1	25.2
25.9	26.1	26.4	27.0	27.3	28.8

1) Draw a number line and mark the lower and upper extremes (the least and greatest data values).

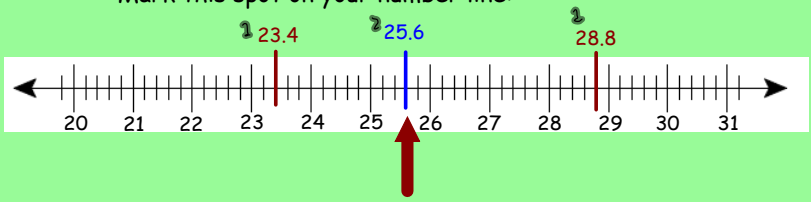


2) Find the median of the data and mark this on the number line.

There are 12 numbers -->your median in this example is between the 6th & 7th number:

6th number + 7th number $= \frac{25.2 + 25.9}{2} = \frac{51.1}{2} = 25.55 =$ **25.6**

Mark this spot on your number line:

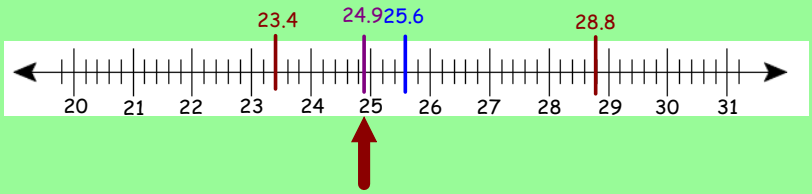


3) Find the lower quartile (median of the lower half of the data), and mark this on the line.

median (lower half) => the middle of the 1st set of numbers

median (lower half) = so between the 3rd and 4th number $= \frac{24.8 + 25.0}{2} =$ **24.9**

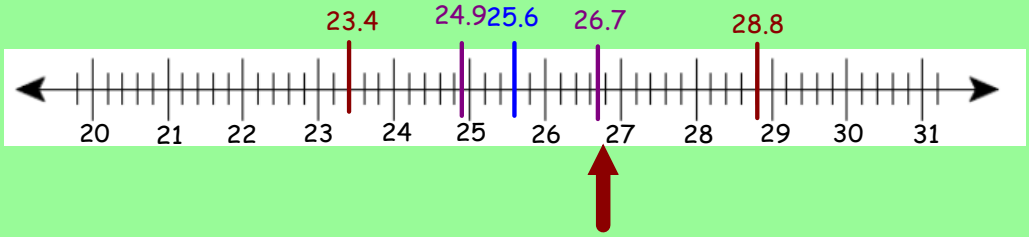
Mark this spot on your number line:



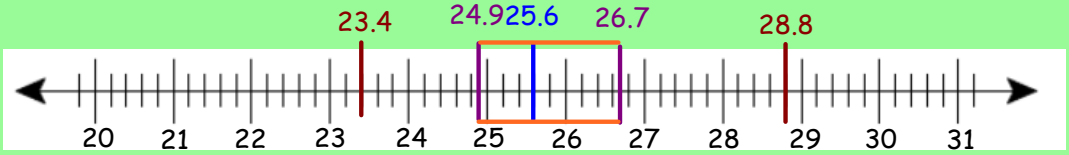
4) Find the upper quartile (the median of the upper half of the data), and mark this on the line.

median (upper half) = the middle of the 2nd set of numbers

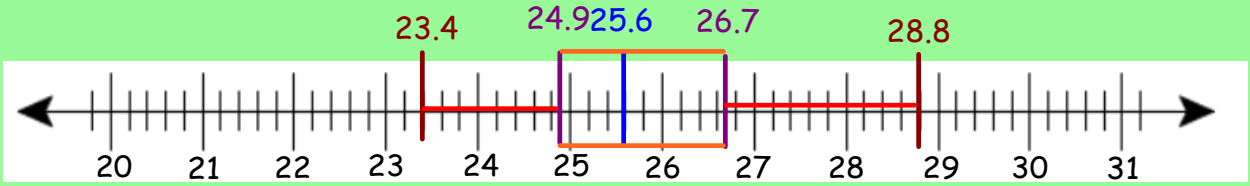
median (upper half) = between the 9th and 10th number $= \frac{26.4 + 27.0}{2} =$ **26.7**



5) Construct a box connecting the upper and lower quartiles. Make sure to label the median, upper and lower quartiles.

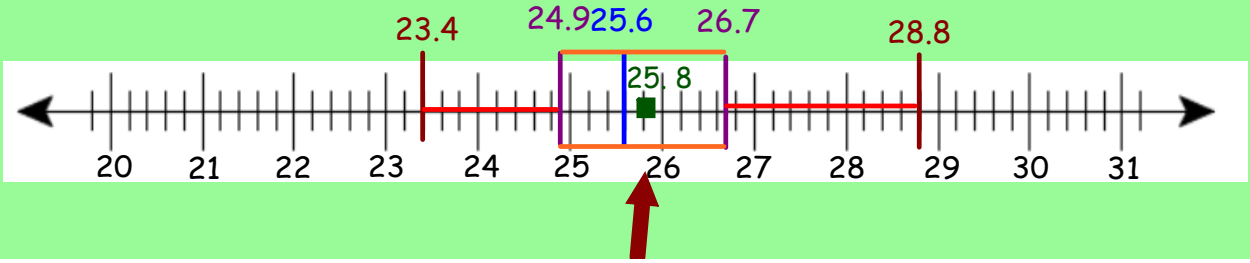


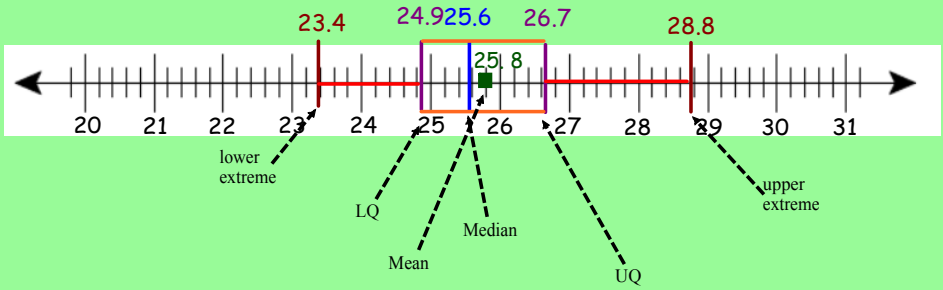
6) From the upper quartile to the upper extreme draw a line. From the lower quartile to the lower extreme draw a line.



7) Add in the mean by representing it as a box.

$$\bar{X} = \frac{\Sigma}{n} = \frac{309.3}{12} = 25.77 = \boxed{25.8}$$





1. What could be classified as the outliers of this data? Why?

   Your lower and upper extremes could be considered outliers. This is because they are furthest from the mean and median of the data.

2. What does this box and whisker tell us about the data that just the "average" wouldn't?

   An "average" wouldn't be able to tell you the spread of the data. (ie. Outliers, middle of the data, and where most numbers are.)

3. What would a typical time to eat at the restaurant?

   The mean or median (25.6 and 25.8)

4. How much time would 50% of the people take to eat at the resturant? (Between which two numbers?)

   Numbers within the box (from 24.9 to 26.7)

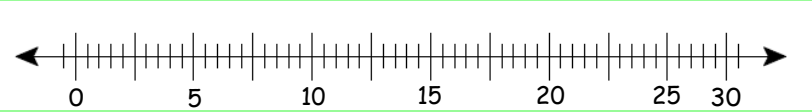
Practice:

The basketball coach has recorded the statistics for home many points one of his basketball players has made throughout the season up until now. Construct a box and whisker.

2 2 4 8 10 14 16 20 22 23 23 24 25 25 25

<u>You need to find and mark on your number line</u>:

-the lowest and highest numbers	2 and 25
-the median	20
-the lower and upper quartiles	8 and 24
-the mean	16.2



Classwork/Homework:

- Complete the practice question from the page before.
- Complete questions 9 - 14 on pages 20 and 21.
- <u>For question 14</u>, only construct a box and whisker, and do not worry about making one with a graphics calculator.

Box & Whisker Plot	
Advantages	**Disadvantages**
• highlights outliers • shows median • shows where the middle 50% of the values are found	• does not show all data values • does not indicate the number of data values • mean and mode cannot be found using the display